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Success and Impact Factors of the Implementation of Electronic Medical Records in Hospitals; Literature Review

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ABSTRACT

The implementation of Electronic Medical Records (EMR)—a digital system for recording, storing, and managing patient data—has become a cornerstone of modern healthcare reform worldwide. EMR adoption enhances service efficiency, patient safety, and coordination among healthcare units. In Indonesia, the Ministry of Health through Regulation No. 24 of 2022 mandates hospitals to transition from paper-based to digital medical records as part of the national digital health transformation. This study aims to analyze the key success factors, challenges, and impacts of EMR implementation in Indonesian hospitals, with a specific focus on the role of human and technological readiness. Using a systematic literature review method, ten peer-reviewed journal articles published between 2021 and 2025 were reviewed and synthesized through thematic analysis. The findings show that human resource factors—such as digital literacy, user acceptance, and continuous training—are essential for successful adoption, while technological factors—including system reliability, data security, and internet stability—serve as critical enablers. EMR implementation improves efficiency, data accuracy, and service quality, yet persistent challenges such as limited technical support, uneven digital infrastructure, and staff resistance remain. The novelty of this research lies in integrating human and technological perspectives within Indonesia's healthcare context, offering a more holistic understanding of EMR readiness. The study's implications emphasize the need for national policies that strengthen capacity building, ensure system interoperability, and promote sustainable digital transformation to enhance healthcare quality across Indonesia.

Keywords: Electronic Medical Records, Human Resources, Technology, Hospital, Implementation

INTRODUCTION

Digital transformation in the health sector is growing rapidly, especially through the implementation of Electronic Medical Records (RME) which is believed to improve service quality, efficiency, and patient safety. RME allows for more accurate, fast, and easily accessible management of patient data by various healthcare units. In Indonesia, the implementation of RME is strengthened through the Regulation of the Minister of Health (Permenkes) No. 24 of 2022 concerning Medical Records, which affirms the obligation of hospitals to switch from paper-based medical records to digital systems. This regulation shows the government's commitment to encouraging health digitalization while demanding hospital readiness in terms of human resources and technology.

Globally, the implementation of RME has become a standard for health services in many developed countries because it has been proven to improve coordination between professions, strengthen referral systems, and support public health data analysis. However, in Indonesia, the implementation process still faces various obstacles ranging from limited devices, resistance of health workers, to differences in readiness between hospitals. Research by Ayuni, Ikawati, and Ansyori (2024) shows that computer limitations, network disruptions, and low staff understanding are the main challenges in the implementation of RME (Amelia Septi Ayuni et al., 2024). In line with that, Rahmayuli (2024) emphasized that the understanding and involvement of health workers has a significant effect on the efficiency of outpatient services, especially in reducing administrative errors (Rahmayuli, 2025). Although it has great potential, the implementation of RME is not free from challenges. HR factors, such as digital literacy, attitudes to change, and training, play an important role in successful adoption. On the other hand, technology support, including hardware, internet networking, data security, and vendor support, also determines the extent to which the RME can function optimally. Therefore, it is important to conduct a literature review to understand the success factors and impact of RME implementation in Indonesian hospitals, so that it can provide an overview
comprehensive for future practices and policies.

The purpose of this study is to analyze the key success factors, challenges, and impacts of Electronic Medical Records (EMR) implementation in hospitals across Indonesia, with a specific focus on the readiness of human resources and supporting technology. The results are expected to provide several important benefits. Theoretically, this study contributes to the development of digital health management literature by integrating human and technological perspectives into a single analytical framework, offering insights into how these dimensions interact to determine EMR performance. Practically, the findings can serve as a reference for hospital administrators, policymakers, and the Ministry of Health in formulating strategies to enhance EMR implementation—such as improving digital infrastructure, strengthening training programs for medical personnel, and ensuring vendor accountability.

RESEARCH METHODS

This study uses the Systematic Literature Review (SLR) approach. The article

search was conducted through two databases, namely Google Scholar and Garuda, with keywords related to factors and impacts of the implementation of electronic medical records in hospitals. Search limits are set for articles published in the 2021–2025 time frame, in Indonesian or English, and can be accessed in full text. From the initial search results, 24 articles were obtained (22 from Google Scholar and 2 from Garuda). After screening based on inclusion criteria (research in hospitals, discussing success factors or implementation impacts, full-text and peer-reviewed journal articles) and exclusion (research at health centers/clinics, only focusing on technical aspects, not peer-reviewed articles, or published before 2021), a total of 14 articles were issued. Thus, there are 10 articles used in this literature review.

Literature searches were carried out through two main databases, namely Google Scholar (scholar.google.com) and Garuda (garuda.kemdikbud.go.id). The selection of these two databases is based on the availability of academic articles in Indonesian and English, as well as their relevance to the context of the implementation of Electronic Medical Records (RME) in hospitals.

The keywords used in the search included: *"implementation of electronic medical records"*, *"electronic medical record adoption*", *"RME success factors"*, *"human resources and EMR"*, *"technology infrastructure hospital"*, *"RME Indonesia"*, and *"impact of electronic medical records"*. The keywords are designed to reach articles that specifically address the factors of human resources (HR), technology, and the impact of RME implementation.

The article selection process is carried out in stages. The first stage is a review of titles and abstracts to assess the relevance to the research theme. Relevant articles are then further selected through reading the full text to ensure the suitability of the content with the focus of the study, namely human resource factors, technology, and the impact of RME implementation in hospitals. Articles that do not meet the inclusion criteria, such as out-of-hospital research, articles that only address technical aspects with no success factors, or publications before 2021, are excluded from the analysis list.

From the initial search results, 24 articles were obtained (22 from Google Scholar and 2 from Garuda). After a screening process based on inclusion and exclusion criteria, a total of 10 articles were selected for further analysis in this literature review.

Table 1. Inclusion and Exclusion Criteria

Yes	Inclusion	Exclusion
1	Articles published in 2021–2025	Articles before 2021
2	Written in or Languag Indonesia e English	Are written in language besides Indonesian/English
3	Empirical research articles (quantitative, qualitative, or mixed methods)	Articles in the form of reviews, editorials, or opinions
4	The research was conducted in an Indonesian hospital	Research conducted in health centers, clinics, or abroad
5	Discuss the success or impact factors of RME implementation	Only focus on digitizing archives or non-RME systems

6	Peer-reviewed and fully accessible articles (full text available)	Articles without full access or not through peer-review

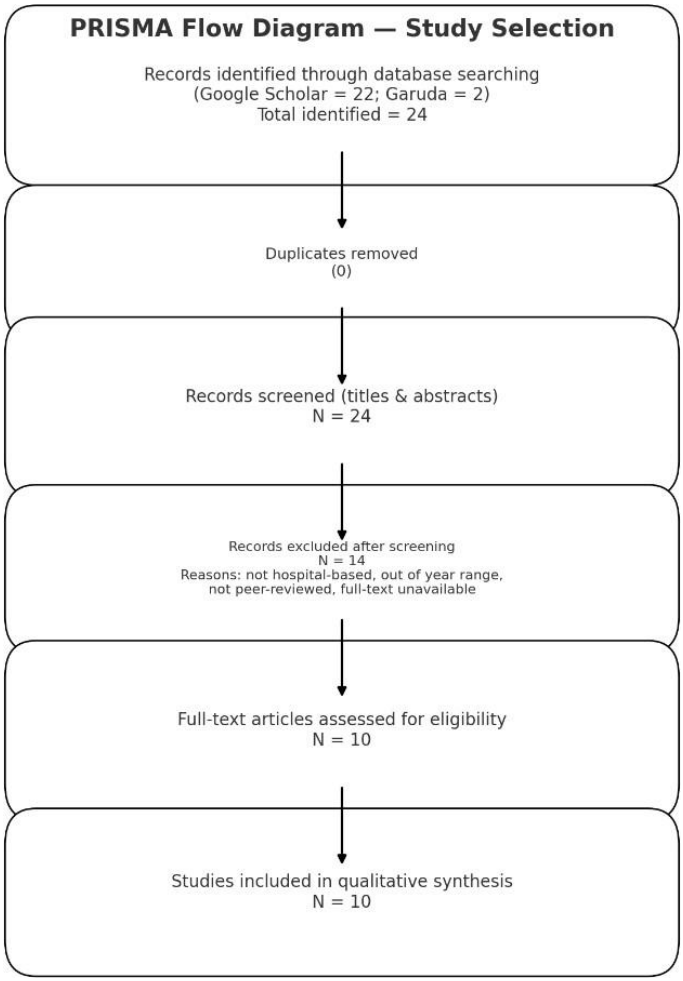

Figure 1. Data Extraction

RESULTS AND DISCUSSION

From the search results, 10 articles that met the analysis criteria highlighted various aspects of RME implementation, ranging from the perception of benefits and ease of use, understanding of health workers, organizational readiness, digital maturity, operational efficiency, to user satisfaction. The

study shows that the dominant factors that affect the success of the implementation are human resources (HR) and technology. The impact includes increased service efficiency, better quality of medical documentation, but also accompanied by obstacles in the form of technical glitches and user resistance. Overall, the success of RME implementation in hospitals is determined by the synergy between human resource readiness and technology support.

Success Factors for RME Implementation

The HR factor is one of the key aspects. Several studies highlight the importance of readiness to accept change, computer self-efficacy, and health workers' understanding of the use of RME. Other studies emphasize the need for continuous training, user acceptance, and adequate digital literacy. In general, digital competencies, active engagement, and staff acceptance are important indicators that influence the success of RME implementation.

In terms of technology, the dominant factors include hardware availability, internet network stability, completeness of system features, data security, and vendor support. The research found that a user-friendly system, stable network, and responsive technical support are important determinants in supporting smooth implementation. On the contrary, feature limitations, system errors, and network glitches have been proven to hamper the effectiveness of RME

Impact of RME Implementation

The impact of the implementation of RME can be seen from two sides. First, the impact related to human resources, namely improving digital skills, work efficiency, user satisfaction, and improving communication between professions. However, some studies have also noted the resistance of some health workers, increased administrative workload, and decreased compliance when service load is high. Second, the impact related to technology, including cost efficiency through reduced paper use, acceleration of administration, improvement of medical data accuracy, and integration of information between units. However, negative impacts also arise in the form of system disruptions, limited interoperability, and suboptimal security of patient data.

Themes and Synthesis

Table 2. RME Implementation Review Literature

Yes	Title & Author	Location	Purpose	Methods & Participants	Key Factors (HR & Technology/Infrastructure)	Impact
1	Implementation of Electronic Medical Records in Hospitals -- Ayuni, Ikawati & Ansyori (2024)	Private Hospital, Lampung	Identify the implementation of RME from the aspects of HR, infrastructure, and management	Descriptive qualitative, interview (12 health workers)	Human resources: understanding of staff, readiness to accept changes. Technology: computers are limited, networks are often disrupted.	Recording efficiency increased, but device & network constraints slowed down service.

Yes	Title & Author	Location	Purpose	Methods & Participants	Key Factors (HR & Technology/Infrastructure)	Impact
2	The Effect of Understanding and Implementing RME on the Efficiency of Outpatient Services -- Yelfi Rahmayuli	Permata Hati Hospital, Indonesia	Assess the influence of understanding & implementation of RME on service efficiency	Quantitative, questionnaire survey (125 health workers)	HR: understanding and user engagement. Technology: network infrastructure.	Service efficiency, reduction of administrative errors.
3	Readiness Analysis of EMR System -- Eka Wilda Faida et al.	Surabaya Hospital, Indonesia	Analyze the level of RME readiness in secondary hospitals	Descriptive observational, DOQ-IT questionnaire (228 respondents)	Human Resources: Training & Staff Readiness. Technology: IT infrastructure ready (servers, networks).	The hospital is considered 'very ready', service efficiency has increased.
4	The Efficiency Level of RME Use at Dr. Kariadi Hospital -- Kharmi Juni Yanti et al.	Semarang, Indonesia	Analyze the impact of RME implementation on efficiency & cost	Qualitative, interview & observation (doctors, nurses, operational staff)	HR: continuous training. Technology: server & stable network.	Cost efficiency (paper saving), increased productivity.
5	Analysis of the Readiness of Outpatient RME Implementation at X Hospital Banjarmasin -- Muhamad Nafis et al.	Banjarmasin Hospital, Indonesia	Assess the readiness of outpatient RME implementation	Quantitative descriptive, DOQ-IT questionnaire	HR: commitment & computer skills. Technology: IT infrastructure is quite ready.	Service efficiency, acceleration of administration.
6	Evaluation of the Implementation & Digital Maturity Level of RME at Mataram City Hospital -- Risna	Mataram City Hospital, Indonesia	Evaluating the implementation of RME with the HOT-Fit model	Qualitative case studies, observations, interviews, FGDs	HR: digital competence & acceptance. Technology: limited features, slow internet.	Time efficiency, lab & radiology data integration.

Yes	Title & Author	Location	Purpose	Methods & Participants	Key Factors (HR & Technology/Infrastructure)	Impact
	Jayanthi & Lutfan Lazuardi					
7	The Relationship of RME Implementation to User Satisfaction -- Maudy Mirsanda et al.	RS Ciremai, Cirebon	Measure the relationship of RME implementation to user satisfaction	Quantitative analytics, questionnaire (79 health workers)	HR: user acceptance. Technology: quality system & service.	There is a significant relationship with user satisfaction.
8	RME Implementation: Qualitative Study -- Muh Amin et al.	Private Islamic Hospital, Indonesia	Explore the RME user experience	Qualitative, phenomenological interviews (9 participants)	Human resources: digital literacy, user participation. Technology: Infrastructure often errors.	Data completeness, communication efficiency, system error barriers.
9	Evaluation of Implementation and Digital Maturity of RME at Mataram Hospital (another version, UGM)	Mataram Hospital, Indonesia	Evaluation of the implementation of RME with HOT-Fit	Qualitative case studies	HR: Competence is quite good. Technology: mismatch features & needs.	The level of digital maturity level 3, integration is not optimal.
10	Analysis of Factors Inhibiting the Implementation of RME at dr. R. Goeteng Taroenadibrata Hospital -- Fajar & Pratiwi (2024)	Purbalingga Hospital, Indonesia	Identifying factors inhibiting RME implementation	Qualitative, interview & observation of medical staff and management	HR: user resistance, lack of training. Technology: computer limitations, system interference.	Shamed service, low user satisfaction, double logging process (manual & RME).

Critical Evaluation

The majority of studies use descriptive, qualitative, and quantitative survey approaches, while only a small percentage apply systematic evaluation frameworks such as HOT-Fit or DOQ-IT. This diversity of

methodologies enriches the point of view, but at the same time emphasizes the limitations of the standard of analysis. Sources of literature are generally from peer-reviewed national journals, accompanied by several proceedings articles of varying quality of evidence.

Consistent findings show that HR and technology are the dominant factors in the implementation of RME, with a significant impact on service efficiency, medical data accuracy, and user satisfaction. However, generalizations are still limited because most studies focus on one particular hospital or region. In addition, technical aspects such as data security, interoperability, and long-term cost analysis are still rarely studied in depth. The 2021–2025 publication range is relevant to depicting the latest developments, but the dynamics of recent implementation, including integration with national policies, may not be fully covered.

The results of the study show that the success of the implementation of RME in hospitals is greatly influenced by two main factors, namely the readiness of human resources and technological support. Healthcare workers who have digital literacy, acceptance of new systems, and ongoing training tend to be able to optimize the benefits of RME. Instead, resistance, skill limitations, and additional workloads are frequent obstacles.

In terms of technology, hardware, internet network, completeness of system features, data security, and vendor support are important elements. A stable and user-friendly system promotes efficiency, while technical limitations such as system errors, feature limitations, and suboptimal data security cause obstacles.

The balance between human resource readiness and technology is an important prerequisite. Good infrastructure will not be effective without the support of human resources who are ready to adapt, while competent human resources cannot work optimally without adequate technological support. Therefore, the implementation strategy should include both aspects proportionately.

Discussion and Implications

This review reveals that human resource and technological readiness are interdependent determinants of successful Electronic Medical Record (EMR) implementation in Indonesia. The findings align with Al-Kahtani et al. (2022), who emphasized that digital competence and user acceptance are stronger predictors of EMR success than mere system availability. However, unlike studies in developed contexts (e.g., Moussa et al., 2023), which report high adoption rates due to advanced infrastructure, this review highlights that resistance among healthcare workers in Indonesia often stems from increased workload perceptions, inadequate system customization, and low digital literacy. Alternative interpretations suggest that resistance may also reflect deeper institutional factors—such as hierarchical organizational culture and limited participatory decision-making—rather than purely individual reluctance. Hence, beyond technical training, hospitals must adopt structured change management frameworks and continuous professional development programs to foster positive behavioral adaptation toward digital transformation.

From a technological standpoint, this study reinforces earlier evidence by Khalifa

(2021) that infrastructure stability, data protection, and interface simplicity are critical enablers of sustainable EMR use. Yet, compared to global standards, Indonesia's implementation faces uneven technological readiness across hospitals, particularly in network reliability and vendor support. This finding implies that system design should integrate user-centered principles and robust cybersecurity measures to enhance usability and trust. Furthermore, long-term vendor partnerships are necessary to ensure technical continuity, upgrades, and system maintenance, minimizing operational disruptions.

In terms of policy implications, the findings extend beyond prior studies by identifying the gap between regulatory frameworks (e.g., Regulation No. 24/2022) and their real-world execution. While the regulation provides a strong legal foundation, practical implementation remains hindered by unequal infrastructure, budget constraints, and limited regional supervision. Thus, future digital health policies should include a national implementation roadmap, interoperability standards, and funding mechanisms to ensure equitable digital access across hospitals. Regular audits and monitoring will also strengthen accountability and prevent regional disparities in digital transformation outcomes.

For future research, this review identifies a methodological gap in the literature: most studies remain descriptive or single-site, limiting generalization. Subsequent studies should employ multi-hospital mixed-method or longitudinal designs to capture variations across settings and measure EMR impacts on efficiency, patient outcomes, and cost-effectiveness. Moreover, sensitivity analyses such as examining system performance under different user loads or network conditions are necessary to assess system resilience. Future investigations should also explore organizational culture, leadership engagement, and patient participation as mediating factors influencing EMR sustainability. By addressing these areas, future research can advance theoretical development in digital health management while providing evidence-based insights for policymakers to design inclusive and sustainable health information systems in Indonesia.

CONCLUSION

This literature review confirms that the implementation of RME in Indonesia is influenced by human resources and technology factors as the main variables. Positive impacts reported include improved operational efficiency, medical data accuracy, user satisfaction, and improved inter-unit coordination. However, obstacles in the form of resistance of health workers, device limitations, network disruptions, and system errors are still challenges. The success of RME implementation is highly dependent on the balance between human resource readiness and technology support. Further research is needed to strengthen large-scale quantitative evidence, explore technical aspects in depth, and assess the effectiveness of RME on a national scale to support sustainable digital transformation of health in Indonesia.

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